

**REMARKS**

Claims 16-35 were examined in the Office Action mailed October 24, 2008.

The Applicants note with appreciation the Examiner's indication that claims 29 and 31 recited patentable subject matter.

The following objections and rejections are currently pending:

- Objection to claims 34-35 for lack of antecedent basis for the phrase "the switching device."
- Rejection of claims 16, 26-28 and 33 under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 5,778,666 to Cullen, *et al.* ("Cullin") in view of U.S. Patent No. 6,766,642 B2 to Binder, *et al.* ("Binder").
- Rejection of claims 17-25, 30 and 32 under § 103(a) as unpatentable over Cullen and Binder, in further view of U.S. Patent No. 6,832,473 to Kupe, *et al.* ("Kupe").
- Rejection of claim 34 under § 103(a) as unpatentable over Cullen, Binder and Kupe, in further view of U.S. Patent No. 6,779,339 to Laroo, *et al.* ("Laroo").
- Rejection of claim 35 under § 103(a) as unpatentable over Cullen and, in further view of Laroo.

The Applicants have amended claim 29 into independent form to place claims 29 and 31 into condition for allowance.

In addition, the Applicants have amended independent claims 16 and 28 to recite that the third operating mode has a constant composition, and extends for a predetermined period: "a third operating mode, established for a predetermined period after the first operating mode and before the second operating mode, with a constant exhaust gas composition which has a lower content of oxidizing constituents than the first operating mode and a lower content of reducing constituents than the second operating mode." Support for

these amendments may be found in the original Specification, for example, at paragraphs [0037]-[0038], and Fig. 2.

Finally, the Applicants have added new dependent method claims 36-37 and dependent system claims 38-39. These claims recite an additional feature originally disclosed in Specification ¶ [0036]. Specifically, as shown in Fig. 2 and described in ¶ [0036], the air/fuel ratio is maintained in region II at a level near, and slightly above, 1.0. An air/fuel ratio of 1.05 is identified in ¶ [0036] as an example “slightly above” air/fuel ratio. In view of this original disclosure, the Applicants respectfully submit that no new matter is added by the new dependent claims.

The following remarks address the issues identified in the October 24, 2008 Office Action.

1. **The Antecedent Basis Issue Has Been Addressed.** The Applicants have amended claims 34 and 35 to change “the” to “a” switching device to address the antecedent basis issue.

2. **The Claims Are Patentable Over Cullen, *Et Al.*** The Applicants respectfully traverse the pending § 103(a) rejections based on the Cullen reference, on the ground that this reference does not teach or suggest the features of the exhaust gas purification system and method of the present invention for which it is cited.

**The Present Invention.** As recited in the independent claims and as shown by way of example in present Fig. 2, the present invention seeks to obtain the highest possible NO<sub>x</sub> purification in an exhaust system having a nitrogen

oxide storage catalytic converter upstream of a SCR catalytic converter. This is achieved by supplying exhaust gas with an excess of oxidizing constituents in a first operating mode (region I in Fig. 2), supplying exhaust gas with an excess of reducing constituents in a second operating mode (region II in Fig. 2) and between the first and second operating modes, supplying in a third operating mode exhaust gas with lower oxidizing constituents than the first operating mode and lower reducing constituents than the second operating mode (region III in Fig. 2).

In this way a problem in prior art systems is addressed: the presence of “even relatively small residual quantities of oxidizing constituents” in the converter after a switch directly from a lean to a rich mixture can have a surprisingly significant effect on NO<sub>x</sub> reduction to NH<sub>3</sub>, where “relatively powerful reactions, impede[d] the reduction of NO<sub>x</sub> accumulated in the catalyst material to form NH<sub>3</sub> on account of the oxygen still being present.” Present Specification ¶ [0007]. Such reactions are known to “potentially result[ ] in sudden release of accumulated NO<sub>x</sub> and its escape from the converter prior to reduction to NH<sub>3</sub>,” also known as “NO<sub>x</sub> breakthrough.” *Id.* In the present invention, rather than rapidly switching directly between the excess oxidizing and excess reducing modes, the exhaust gas is held in an “intermediate” mode with a less oxidizing and less reducing exhaust gas constituent mixture for a period sufficient to eliminate the residual oxygen, thereby ensuring the NO<sub>x</sub> is sufficiently reduced after it is released from storage and before it leaves the

nitrogen oxide catalyst, and sufficient  $\text{NH}_3$  is formed from the  $\text{NO}_x$  to provide to the downstream SCR catalyst for further exhaust gas purification.

The Cullen Reference. Cullen does not teach or suggest the present invention's maintenance of a third operating mode which provides sufficient time for elimination of residual oxygen in the transition from lean to rich modes. Rather, as shown in Fig. 2, the exhaust gas mixture never enters a third mode of the sort recited in the pending claims. Instead, Cullen drops immediately from a lean mode (region 3) to a rich mode (region 7) in a continually decreasing manner (region 8), at least until a stoichiometric mixture is reached and the exhaust gas drops directly into the rich mode (region 7). Thus, Cullen neither discloses or suggests the claimed oxygen-clearing third mode "established for a predetermined period after the first operating mode and before the second operating mode, with a constant exhaust gas composition which has a lower content of oxidizing constituents than the first operating mode and a lower content of reducing constituents than the second operating mode."

Because Cullen does not teach or suggest the claimed third mode, and further because none of the other cited references cures Cullen's deficiencies, the pending claims are patentable over all of the cited references under § 103(a). Accordingly, reconsideration and withdrawal of the pending § 103(a) rejections is respectfully requested.

CONCLUSION

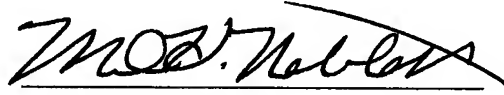
In view of the foregoing, the Applicants respectfully submit that claims 16-35 are in condition for allowance. Early and favorable consideration and issuance of a Notice of Allowance for these claims is respectfully requested.

If there are any questions regarding this response or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket # 095309.57591US).

Respectfully submitted,

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